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Telephone services

Health Building Note 48

NATIONAL HEALTH SERVICE IN SCOTLAND
ESTATES ENVIRONMENT FORUM

NHS Estates
An Executive Agency of the Department of Health

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London: The Stationery Office

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About this series

The Health Building Note (HBN) series is intended to give advice on the briefing and design implications of Departmental policy.

These Notes are prepared in consultation with representatives of the National Health Service and appropriate professional bodies. Health Building Notes are aimed at multidisciplinary teams engaged in:

- designing new buildings;
- adapting or extending existing buildings.

Throughout the series, particular attention is paid to the relationship between the design of a given department and its subsequent management. Since this equation will have important implications for capital and running costs, alternative solutions are sometimes proposed. The intention is to give the reader informed guidance on which to base design decisions.

Executive summary

Health Building Note (HBN) 48 – 'Telephone services' provides guidance on telephone systems. This document updates and supersedes the first edition of HBN 48, published in 1989.

Following the publication of HTM 2055 – 'Telecommunications (Telephone exchanges)' in April 1994 and the update of the NHS Model Engineering Specifications (MES) C47 'Telephone exchanges more than 150 extensions', a need has been created to review and update HBN 48.

HBN 48 is primarily concerned with the initial provision of telephone services in a large acute general hospital. Systems of 150 to 1600 extensions are covered; however, the HBN also provides general guidance on larger systems with greater capacity. The technical details of design, specification, procurement and commissioning of telecommunications networks and exchange equipment are excluded from this HBN. For guidance on these issues, reference should be made to HTM 2055 and MES C47.

HBN 48 does not include specific space and cost requirements for data communications equipment. Allowance should be made for these, and guidance on this area may be found in Health Guidance Note – 'Structured cabling for IT systems'.

It is important to remember that the management of the NHS Estates' telecommunications policy is vested with the Information Management Group (IMG), and executed by the Central Communications Management Group (CCMG). The CCMG is supported by eight Local Communications Management Groups (LCMG). Project teams considering the installation of a telephone service should liaise with the IMG and its sub-groups. In Scotland, the Scottish Office DoH Management Executive should be consulted on policy issues.

Chapter 1 outlines the scope of this HBN, and Chapter 2 describes the service considerations. General and specific design requirements are included in Chapters 3, 4 and 5. Guidance on engineering services is provided in Chapter 6, and Chapter 7 includes information on costs. Information on staff training is included in the appendix.

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1.0 Scope of Health Building Note 48

1.1 This new edition of Health Building Note (HBN) 48 provides guidance on telephone services and telephone systems. It contains information on the facilities offered by modern electronic equipment and data for determining the capacity of telephone exchanges. It also describes the accommodation required for telephone exchange equipment and operators' rooms. The guidance is relevant to the planning of new systems as well as to the rationalisation and upgrading of existing services.

1.2 It replaces the first edition of HBN 48, published in 1989, and Scottish Hospital Planning Note 48 – 'Telecommunications'.

Inclusions

1.3 The guidance given is primarily concerned with the provision of telephone services at an acute or district general hospital (AGH/DGH). It deals not only with the initial provision of a system for a new site, but also with the factors that should be taken into account when replacing an existing system on an established site. Systems within the range 150–1600 extensions are covered. For systems outside this range, this HBN will provide general guidance but the cost allowances and space information will not be valid.

1.4 Factors which affect the capacity of the exchange and consequent accommodation requirements are also covered. These include the requirements for telephone network services to other hospitals and the handling of calls for remote or peripheral healthcare premises.

1.5 Planning teams should co-opt appropriate professional advice at the earliest possible stage when planning a new telephone service or when rationalising and upgrading an existing service. When planning teams discuss and define their project requirements with telecommunication engineers they will inevitably encounter specialised technical terms which they will need to understand. This HBN introduces and explains such terms and their related commonly-used abbreviations at the appropriate points in the text.

Exclusions

1.6 Technical guidance which is more appropriate to those concerned with the detailed design, specification, procurement and commissioning of telecommunications networks and exchange equipment is excluded. Technical information on the features of electronic telephone exchange equipment is included in the design notes within NHS Model Engineering Specification C47 (see paragraph 6.3).

1.7 This HBN does not provide guidance for the technical specification of ancillary communications services, for example staff paging, radio, and data transmission.

Capital Investment Manual

1.8 The Capital Investment Manual contains the NHS Executive's procedural framework governing the inception, planning, processing and control of individual health building schemes; in Scotland, comparable procedures are in place. There are various mandatory requirements within this overall process but the way these tasks are carried out is mainly for NHS bodies to determine. Approval from the NHS Executive/ Scottish Office Department of Health Management Executive for business cases will depend on how they intend to carry out the mandatory tasks. The Manual gives guidance on the technical considerations of the full capital appraisal process and also provides a framework for establishing management arrangements to ensure that the benefits of every investment are identified, realised and evaluated.

1.9 The responsibility for managing the NHS Estates telecommunications policy is vested with the Information Management Group (IMG) of the NHS Executive, and is executed by the NHS Telecommunications Branch of IMG. The NHS Telecomms Branch consists of a central branch based in Birmingham which is supported by eight regionally based local branches. These functions are reflected in Wales through the Welsh Communications Management Group. In Scotland, advice should be sought from the Scottish Office DoH Management Executive, with particular reference to NHS MEL(1996)80 'Telecommunications policy and management and the NHS Net'.

1.10 Capital Investment Manuals emphasise four key points:

- each individual scheme must be supported by a sound business case. A business case must demonstrate convincingly that the investment is economically sound (through an option appraisal) and financially viable (affordable to the trust and its purchasers);
- an exploration of private finance alternatives should be viewed as a standard option whenever a capital

scheme is being considered. Once the Outline Business Case has been approved, the preferred option should be compared to potential private finance alternatives. Approval to the Full Business Case will not be given unless there is a clear demonstration that private finance alternatives have been adequately tested;

- the delivery of a major capital project is a difficult and complex task. Nevertheless, failure to deliver on time and to cost diverts resources from direct patient care. The establishment of an appropriate project organisation is essential to ensure that projects are delivered within agreed budgets and timescales;
- careful consideration should be given to "managed services".

Cost allowances

1.11 The Departmental Cost Allowance Guides associated with this HBN are promulgated in 'Quarterly Briefing' (issued separately under cover of an Estates Policy Letter) on behalf of the NHS Executive or designated authority specific to your region. In Scotland, cost guidance is available from the NHS in Scotland Estates Environment Forum through its executive branch, the Healthcare Engineering and Environment Unit.

Equipment

1.12 Equipment is categorised into four groups, as follows:

a. Group 1: items (including engineering terminal outlets) supplied and fixed within the terms of the building contract;

b. Group 2: items which have space and/or building construction and/or engineering service requirements and are fixed within the terms of the building contract but supplied under arrangements separate from the building contract;

c. Group 3: as Group 2, but supplied and fixed (or placed in position) under arrangements separate from the building contract;

d. Group 4: items supplied under arrangements separate from the building contract, possibly with storage implications but otherwise having no effect on space or engineering service requirements.

1.13 Group 1 items are provided for in the Departmental Cost Allowances associated with this Note. The Department of Health Equipment Cost Allowance Guide (ECAG) specifies a sum of money for the functional unit for Groups 2 and 3; the ECAG does not cover Group 4.

Works Guidance Index

1.14 This volume indexes under subject references much of the relevant guidance that is current at the time of publication. Specific issues, such as arrangements for dealing with fire, security, energy conservation etc, are also covered by other published guidance which must be taken into account. It is recommended that project teams check the current edition of the Works Guidance Index and investigate the possibility of changes occurring since its publication.

2.0 General service considerations

General telephone system considerations

2.1 This chapter considers the general aspects which should be taken into account in the provision of a telephone service. The planning of a new installation, or the replacement of an existing large telephone exchange, should never be carried out in isolation from other locally related factors. A review of service requirements for the trust/health authority and the overall strategy for telephone facilities within the area are fundamental issues in determining the level of provision that is appropriate for a particular site. This document should also be read in conjunction with HTM 2055 – 'Telecommunications (telephone exchanges)', which contains a chapter on definitions and abbreviations that are in general use in the telecommunication industry.

2.2 Particular consideration should be given to:

a. all communication requirements with a view to integrating telephones with other systems, for example staff paging;

b. a review of the effect that the provision of a new exchange may have on the telephone service to and within adjacent healthcare buildings;

c. the provision for making calls to the external emergency services (that is, fire, police and ambulance); HTM 82 gives specific recommendations to ensure reliable contacts with the local fire brigade;

d. the possibility of using the exchange as part of a network, that is, allowing extension users on linked and satellite exchanges to extend calls through the main exchange to other remote or peripheral exchanges. In Wales, use of the Welsh Health Telephone Network should be considered;

e. the possibility of providing at a major site, operator facilities and services for smaller off-site peripheral healthcare buildings to achieve revenue savings;

f. any future requirements for data transmission or remote call logging and related space implications;

g. better utilisation of any existing inter-switchboard circuits or private lines, for example possibly by forming a network based on the main telephone exchange;

h. maintaining certain telephone lines in use when the main system fails.

Integration with IT systems

2.3 When planning for a new telephone installation, it is recommended that the information technology (IT) planning authority for the site is consulted to determine in what areas a joint planning approach would be beneficial. The areas which might be covered are:

a. common use of duct systems, wiring closets and outlet points;

b. provision of sufficient capacity for data transmission between telephone extension points, or to the exchange room, to reach parts of the site lying beyond the range of existing data cabling;

c. the potential for shared use of inter-site digital transmission lines, whether through the exchanges on both sites, or using separate line connection equipment;

d. the use of digital exchange lines for dial-up data links;

e. the availability of fibre optic cabling for linking components of a distributed telephone system.

Liaison with public telephone operator

2.4 At an early stage, public telephone operators (PTO) and/or cable companies should be considered as providers of network services. Consideration should be given to the possibility that more than one network provider may provide telecommunications services to a site. This is especially important on a "greenfield site" where the new requirements may necessitate an extension of the local network.

Installation or replacement of telephone exchanges

2.5 The transition in the design of telephone systems from electro-mechanical (Strowger) type to electronic exchanges using stored program control (SPC) is virtually complete. The main factors to be considered now are the type of SPC exchange to be used, its potential for updating and growth coupled with its ability to form part of a network and to provide management information (via call logging systems), and the ease and cost of maintenance. It is important to ensure that the equipment manufacturer proposes to support and develop the system offered for its foreseeable life.

2.6 It should be noted that the normal anticipated life of an SPC exchange is 10 to 12 years. It is important to ensure that any system provided by a supplier will be supported for the maximum time span. Premature replacement due to redundancy affects the depreciation period which, in turn, affects the capital charges for which management may be liable.

SPC exchange facilities

2.7 The SPC exchange is basically an electronic processor controlled by software. The program can be altered within defined limits to cater for changes in service requirements which may take place over time. Standard software packages provide a significant number of facilities for user extensions and operators, but not all of these will be needed in healthcare buildings. Some will have capital as well as revenue cost implications, and the selection of an appropriate range of facilities will need to be made very carefully.

2.8 The selection of facilities is usually made by a "three-level" process:

a. while the trend is towards equipment manufacturers offering a common and comprehensive software program, it is still possible to elect for a simpler program with a limited number of facilities. Further facilities may be optional and may involve the purchase of another, more expensive, program;

b. within the program selected, it is possible to retract any facilities which are considered to be inappropriate;

c. the facilities which are available can then be awarded or denied to the extensions as required. Alterations to the facilities available at a particular extension can readily be made (by the system supervisor) to meet changing needs.

2.9 Some of the facilities offered by SPC exchanges and commonly used in healthcare buildings are:

a. making and receiving internal calls;

b. receiving external calls;

c. graded access for making external calls via the public switched telephone network (PSTN);

d. call barring to selected external numbers;

e. abbreviated dialling of frequently used numbers;

f. coded ringing to differentiate internal from external calls;

g. conference calls for simultaneous conversation between a maximum of six extensions;

h. temporary call diversion to an alternative extension number selected by user;

j. call transfer by an extension user to another extension;

k. night service arrangements.

Other facilities are available, but these are only rarely appropriate for healthcare buildings. Comprehensive details are given in Model Engineering Specification C47 (see paragraph 6.3).

Calls for on-site emergencies

2.10 Calls made within the hospital for an emergency, and the manner in which they are dealt with, are important considerations which should be resolved at the planning stage. Operational policies should encompass all emergency calls – those of a clinical nature, as well as those relating to fire and other critical alarms. The telephone number for emergency services should be easy to remember and easy to dial. Staff moving from one location to another will not be confused if healthcare premises use the same number, but this may not be practical in every case. The preferred number to call is 222 or 2222 for cardiac arrests and 333 or 3333 for all other emergencies. In Northern Ireland, the preferred number for all emergencies is 6000 or 6666.

2.11 All circuits used for emergency calls should terminate in the operator's room on instruments which ensure that incoming calls are clearly distinguished from other traffic. Consoles should only be used if they can provide a louder-than-normal buzzer or ringer, otherwise separate instruments will be required. Instruments with displays can provide an indication of caller location, but they may not be usable in a fall-back situation. The instruments should be within easy reach of operators at all times. The system should be set up so that callers never receive an engaged tone, and operators are always aware of calls waiting for answer.

User input to SPC exchange programming

2.12 The software program for SPC exchanges is configured to the user's requirements on the basis indicated in paragraph 2.8. This will usually necessitate considerable consultation with users, and can be a lengthy task for a large healthcare building. Currently, this work is part of the pre-delivery process and may affect the delivery of the exchange. It is recommended that back-up copies of the system configuration are made by the system supervisor at regular intervals.

2.13 The supplier of the exchange usually assists in the compilation of user requirements. However, some preparatory work may be done in anticipation, as many of the facilities are common to several suppliers of exchanges. This would help to reduce the time taken for final completion of software and delivery of the exchange.

Paging

2.14 It is current practice to couple the paging systems with the telephone exchange. This allows extension users to access the paging system and transmit paging calls without involving the telephone operator.

2.15 Modern digital paging receivers provide visual indication of the extension originating the page, and the paged party simply calls this number.

2.16 The interface between the paging system and the telephone exchange should allow for a minimum of two calls to be handled simultaneously.

Call information logging equipment (CILE)

2.17 This equipment, of which there are many varying types, plays a very important role in the successful day-to-day management of an SPC exchange. It is invaluable for providing traffic information about exchange line and private circuit usage, and also for monitoring operator response. It can also provide statistical information about individual or groups of extensions and, if required, can produce accounts. Modern CILE usually consists of a desktop PC with keyboard and associated VDU.

2.18 Suitable terminations (that is, a V24 access port) and relevant software will normally be provided on the SPC exchange to allow CILE to be easily connected.

2.19 Depending upon the type of exchange and software, it is desirable for CILE to provide, as a minimum, the following information:

a. duration and cost of calls;

b. percentage usage of exchange lines;

c. departmental report summaries;

d. private line usage information;

e. designated number reports;

f. busy and quiet extensions;

g. usage of individual extensions;

h. numbers dialled frequently;

j. histogram reports, for example exchange utilisation, operator time to answer;

k. selective printing of all reports;

m. account generation.

2.20 Care should be taken to select equipment with adequate capacity, incorporating data memory capacity appropriate for the total number of extensions and the traffic being generated. The provision of duplicate terminal equipment in the telecommunication manager's office and in the operator's room leads to greater operational flexibility.

Directory package

2.21 A directory package should be specified as part of each operator's console facility. It is primarily for the telephone operator's use but can normally provide the information required for a site telephone directory when printed. Alternatively, the directory may be provided as part of CILE or as a separate system, with at least one terminal between two operators.

2.22 Directory packages may typically provide the following facilities:

a. two levels of password access:

   Level 1 – for directory enquiry;

   Level 2 – for database changes;

b. two directory databases. Enquiries are made on the current directory, but changes are made on the update directory;

c. choice of directory enquiry under:

   (i) surname;

   (ii) department;

   (iii) subject;

   (iv) extension number;

   (v) location;

d. the directory package will normally allow "information pages" to be created. This will permit instructions to be stored for incident action, for example fire alarm or call-out procedures.

Telephone system management

2.23 Adequate management and supervision of the telephone system is necessary to ensure that it operates at maximum efficiency and keeps pace with the changing requirements of the hospital.

2.24 The initial allocation of extension user facilities will require alteration and updating as needs change. While

this work may be done by the telephone supervisor, it should be approved by management and an updated list of facilities in use should be maintained. Similarly, if CILE or a directory package is provided, proper management and supervision will be necessary, the cost of which should not be underestimated.

2.25 The extensive list of facilities available to the extension user would imply that the extension user must be given adequate training if the system is to be used effectively. Recommendations for staff training are described in the appendix.

Data transmission

2.26 A modern digital telephone exchange can provide data transmission paths through the exchange from extension points or from the exchange location. The former can be used to extend data services to a remote location within a site which is beyond the range of data cabling. The latter can provide direct cross-connections to the main node of a data cabling installation, usually co-located with the exchange.

2.27 Interfaces can be supplied to common standards such as V24, X21 or ISDN2, either for fixed links, or for dial-up use. Switching capacity is unlikely to be a problem if the number of data links is small compared with the number of voice ports on the system.

2.28 Digital trunk lines are increasingly being provided along with new exchange installations. These can give access via the private exchange to both private and public integrated services digital networks (ISDN) for the provision of fixed or dial-up data links to other sites.

Voice processing

2.29 Planners' attention is drawn to additional sub-systems that can be obtained, providing a range of additional services to a telephone exchange.

2.30 An "Automated Attendant" feature can intercept incoming exchange line calls when a switchboard is busy, providing callers with guaranteed prompt answering times. The caller can be given a holding message before being returned to the operator queue. Alternatively, a caller may be allowed to dial direct either to an extension or to one of a range of departments named in the recorded message. This facility can greatly reduce complaints from hospital users unable to reach staff at busy times.

2.31 "Voice mail" facilities can significantly improve communications by providing a central answering service linked to users' telephone extensions. Voice messages can be left in electronic "pigeon holes" for retrieval at the users' convenience. The users can be made aware of messages waiting either through special telephone signals or via their radio pagers. The facilities can be made available to users on other sites.

2.32 Other voice processing facilities include "bulletin boards" allowing telephone users to access pre-recorded information (accessible by a direct public exchange number), for example visiting hours.

2.33 All of the above facilities can be provided by third-party suppliers and added on to existing systems, but it is advisable to consider provision at the same time as exchange replacement, so that the exchange supplier can design and install an integrated system. Costs are likely to be around 10 to 15% of the exchange.

3.0 General functional and design requirements

3.1 This chapter describes the general functional requirements of a telephone service and outlines the accommodation required to satisfy the general service considerations described in Chapter 2, and HTM 2055 – 'Telecommunications (telephone exchanges)'.

Exchange equipment room

3.2 This room houses all necessary telephone switching and power supply equipment, the telephone wiring frames and termination boxes. It may also be required to house any data switching and CILE equipment. It should be equipped with a desk or worktop. Smoke detectors should be provided.

3.3 It is desirable, but not essential, for this room to be situated on the ground floor, to facilitate good access for heavy equipment and to enhance security.

3.4 It is important that surface finishes in this room are of a non-dusting, easily cleanable nature and of a type which dissipates static electricity. Silicon-based cleaning substances must not be used on PVC surfaces.

3.5 Details of anticipated equipment weights are given in paragraph 4.3 and details of approximate room dimensions are given in paragraph 4.4.

Telephone operators' suite

3.6 A self-contained suite consisting of the operators' room, staff rest room and WC is required.

3.7 The security of this suite is an important consideration, as most telephone exchanges are continuously staffed (see paragraph 5.9). The 24-hour operational nature of this department makes it a useful area for receiving hospital alarm systems.

3.8 The operators' room should be at least of the same standard as hospital office accommodation, with an element of natural daylight and natural ventilation wherever possible. The avoidance of glare is a health and safety requirement for the use of consoles with electronic displays and VDUs. Appropriate wall space for alarm panels and desk space for VDU monitors will be needed if these are to be accommodated within this area. If the room is carpeted, this should be of a type which dissipates static electricity.

Location of exchange

New site

3.9 The provision of accommodation in a new hospital does not present special problems. When the capacity of the exchange has been resolved, space requirements can readily be determined and planned within the building envelope.

3.10 It is preferable, for maintenance purposes, to have the exchange equipment room and the operators' room as close together as practicable.

Existing site

3.11 The accommodation of new equipment may present a particular problem in any replacement programme because the existing installation usually has to remain in use until the new exchange is brought into service. Each situation requires to be considered on its merits and the various options examined. The restraints which may be imposed by existing internal distribution cables are discussed more fully in paragraph 4.24.

Assessment of exchange capacity

3.12 The capacity of the proposed exchange needs to be assessed at an early stage in the planning of a new or replacement system, as explained in HTM 2055.

3.13 If an exchange is being provided on a new site, an estimate of the number of extensions may be made by comparison with a similar hospital or by applying the following telephone extension/bed ratios:

Type of hospital	Telephone extension/bed ratio
Major teaching	1.70
DGH*	1.40
Community	1.34
Maternity	0.60
Long stay	0.45

* also referred to as an Acute General Hospital

3.14 When determining the type and size of exchange to be provided, it is important to ensure that the equipment is suitable for future extensions, either within cabinets

initially provided or, if required, by the provision of new cabinets.

3.15 Where an exchange is being replaced, the existing level of provision should not be assumed to be adequate, and a re-assessment of extensions and exchange lines should be made. The ratios suggested in paragraph 3.13 may be applied as a first check on the adequacy of the system. In many cases, a demand for further extensions may have been suppressed because of the lack of exchange capacity. Typical indications of this situation are:

a. a large number of shared extensions;

b. a waiting list for further extensions;

c. a number of small exchange systems with separate exchange lines;

d. a number of direct exchange lines (DEL).

A temporary monitoring exercise using CILE may provide useful information at this stage. Subject to advice from the hospital IT authority, a minimum provision should be made for ISDN extension parts.

Exchange lines

3.16 Several different types of exchange line (also known as "trunk circuits" or "trunks") are available, and their relevant features are described in the following paragraphs.

3.17 Standard exchange lines are graded into three types:

a. incoming only – which accept incoming calls and are answered by the operator;

b. outgoing only – for outgoing calls made either by direct (level 9) access from an extension or via the operator;

c. both way – which are suitable for (a) and (b) above.

It is recommended that any installation should contain a mixture of all types in the approximate proportions 1:1:2 respectively, and the total number of standard lines provided should be equivalent to approximately 10% of the extension capacity of the exchange.

3.18 Direct inward access (DIA) lines can be provided by a feature incorporated in the exchange equipment which enables standard exchange lines to be routed direct to an individual extension, bypassing the operator.

3.19 Direct dialling inward (DDI) lines are a separate block of lines, over and above those described in paragraph 3.17, intended to provide an inward dialling arrangement which bypasses the operator and enables callers to access a pre-determined range of extensions. They are normally provided on a basis of one exchange line per 20 DDI extensions, but their provision needs to be considered carefully. DDI can reduce the operators' workload provided adequate advertisement of numbers has been carried out, but extra capital and revenue cost is involved, and the facility must be fully utilised in order to justify its provision. Not all public telephone systems can offer this facility, and the PTO must be consulted if it is desired to have DDI lines.

3.20 Until recently, exchange lines could only widely be provided with analogue speech transmission. However, the introduction of digital speech transmission has accelerated considerably and reached the stage where it can be offered almost universally. Apart from giving a better quality service, it can be offered as either single or multi-line connectors. Multi-line services which require less termination capacity in the exchange, can provide a mix of all the standard lines referred to in paragraph 3.17 and also the DDI lines referred to in paragraph 3.19; they will also allow outgoing calls on DDI circuits. This mix of circuits can also be changed at very short notice by the PTO using a suitable keyboard re-configuration. At present, the main weakness in universal usage of digital circuits is that the lines will not provide a fallback service in the event of the hospital exchange crashing. It is therefore important to ensure that adequate numbers of analogue lines are provided to meet this need as described in 3.22–3.24.

"Out-of-area" exchange lines

3.21 Where a hospital has a considerable volume of telephone traffic to an adjacent public telephone area which would normally be charged at trunk call rates, it is possible to provide exchange lines from that telephone area as well as from the telephone area normally serving the hospital's location. This would enable calls to be made at local rates, but such an arrangement should be justified economically for any specific project.

Fall back (drop back) of exchange lines

3.22 This is the situation that occurs in the event of a total exchange failure (or "crash") whereby the exchange lines are diverted directly to specific extensions or to a small emergency manual switchboard, to enable minimal communication to take place. In larger, more complex sites, consideration should be given to the possibility of providing a separate small exchange that is available to key extension users in the event of failure of the main exchange. This exchange would have its own extension wiring and separate exchange lines.

3.23 The requirements of an adequate fall back system are very important, and each installation should be considered individually. Sufficient analogue lines should be provided to give a limited incoming service to the

operator's room, and sufficient outgoing/both-way exchange lines should be provided to enable vital hospital facilities to make and receive calls. If a multi-circuit digital service is normally in use, in a line failure situation the PTO can make arrangements for those lines to divert to the analogue lines provided. The requirements of HTM 2055 should also be taken into account when considering this aspect of the system.

3.24 The specific extension instruments providing fall back must be compatible with the type of signalling used on the exchange lines.

Private circuits

3.25 Where there is considerable telephone traffic between geographically separated sites, it may be more economical to provide a private circuit between the respective switchboards rather than pay for individual calls made via the PSTN. Such private circuits are installed by, and usually rented from, a PTO. A PTO may be able to offer a virtual private network (VPN) service, where several sites are connected indirectly via the PTO exchange; this avoids renting lines on a point-to-point basis and simplifies the set-up and management of larger networks. HTM 2055 provides further guidance on private circuits. In Wales, connection to the Welsh Health Telephone Network should be considered.

3.26 Private circuits are also known as tie lines, private lines, inter-switchboard circuits, access lines (a British Telecom term) and sometimes by other local descriptions.

3.27 It should be noted that digital multi-channel private circuits can be made available by some PTOs if the amount of telephone traffic warrants this provision.

Call barring (route restriction)

3.28 SPC telephone exchanges can be programmed to control the access from any individual extension to the public networks, whether local, STD or international. They can also be programmed to bar access to specified numbers such as premium traffic numbers or directory enquiries.

3.29 Outgoing calls made from barred extensions have to be routed via the operator, and this will increase the operator's workload. If barring is extensive, the services of an additional operator may be needed. This will erode potential savings from call-barring, but more effective use of CILE will help overcome this problem.

3.30 In operational terms, a series of classes of service may be used to define the level of access available from extensions. Classes may be graded in ascending order of access as follows:

a. Level 1 – Operator and private lines;

b. Level 2 – Level 1, plus local access but excluding specified numbers;

c. Level 3 – Level 2, plus STD access but excluding specific numbers.

3.31 Normally, the level available at any particular extension can be easily changed by the supervisor or systems manager. Extension users barred from levels 2 or 3 may still be allowed to dial out to a range of commonly-called numbers, such as health centres, other hospitals etc.

Handsets

3.32 Ideally, telephone handsets should be purchased outright as part of the telephone exchange contract. This will ensure that the handsets are technically compatible with the exchange. Particular care must be taken in this respect if nationally negotiated bulk supply contracts are used to purchase additional handsets for an existing SPC exchange. Where handsets are purchased centrally for use with a new exchange, the exchange installer should be contracted to accept, install and test the handsets as part of the complete system.

3.33 As a general guide, handsets should be of a standard pattern and colour to simplify replacement.

3.34 Most modern telephone handsets are suppressed against radio frequency interference in accordance with the requirements of NHS Model Engineering Specification C47 (see paragraph 6.3). However, certain hospital departments, for example physiotherapy/ rehabilitation, utilise medical equipment which emits very high levels of radio frequency radiation, and care must be taken to select handsets for these areas which are not unduly affected by the local high levels of radio frequency interference. It may be necessary in some cases to fit suppressor devices in the wiring. Refer to HTM 2014 – 'Abatement of electrical interference'.

3.35 Allowance should be made for any special requirements, such as hands-free instruments for mortuaries and post-mortem rooms. A number of instruments may be required for use by the hearing-impaired: these are mandatory for lift installations. A number of data extensions may be required for IT use.

3.36 It is not always cost-effective to repair damaged or defective handsets because of the price advantage gained from bulk purchasing. It is recommended therefore that 5% additional handsets should be ordered as spares when the contract is placed and used as replacements for

damaged or defective handsets. However, local repair arrangements can be made, and a repair recording system is recommended.

Payphones

3.37 It is usual to make some provision, at suitable convenient locations, which will allow patients, visitors and staff to make prepaid telephone calls via the public network.

3.38 Payphones may be either fixed (for example in waiting areas in the main entrance and/or in the accident and emergency department and out-patients department) or mobile, in the form of a plug-in transportable trolley (for example for use in in-patient wards). Other HBNs give guidance on individual hospital department requirements, but the total level of provision is a matter for local policy.

3.39 To assist patients with impaired hearing, the handset of payphones should be fitted with an inductive coupler suitable for use with a hearing aid. In addition, consideration should be given to mounting a reasonable number of payphones at a height suitable for a person in a wheelchair.

3.40 Recent changes in regulations concerning the acquisition and use of payphones means that users are no longer restricted to renting them from the PTOs. Consideration should be given to the many alternatives that are available; these include:

a. payphones purchased and managed by the user and connected to exchange extensions, using the normal hospital exchange lines;

b. payphone schemes provided and managed by the PTO or a third party, who may share the profits with the hospital.

Payphones may be provided with a fast-dial key linked to specific numbers, for example taxi firms. It is advisable for payphones to be available for outgoing calls only.

3.41 Coin-operated payphones will usually be the most convenient for all users, but it is a matter for local policy as to whether prepaid phonecard payphones should be provided. If payphones are restricted solely to the phonecard type, consideration should be given to the availability of phonecards. There may be administrative implications associated with the stocking, security and sale of these within the hospital.

Telephones in lifts

3.42 It is common practice to provide a telephone inside lift cars for emergency use, connected to the local telephone system or, in some cases, to an independent company. If a key pad telephone is installed, the number to be used in an emergency should be permanently displayed. Where these are provided in lifts to which patients and visitors have free access, the telephone handset should be fitted with an inductive coupler suitable for use with a hearing aid and accessible to a person in a wheelchair. Co-ordination with the lift supplier will be required to ensure that a telephone box with sufficient space to accommodate this type of handset is provided in the lift car construction.

Intercommunication systems

3.43 A properly planned SPC exchange will provide prompt intercommunication facilities between all extensions. Abbreviated dialling can be used for a range of frequently called extension numbers. Consequently, the provision of separate intercommunication systems should be actively and strongly discouraged.

3.44 Self-contained intercom systems are relatively inflexible and limited in the extent of their economic application. Any subsequent modifications to them usually involve disproportionate cost. In only very rare instances can such systems be justified for functional or clinical reasons.

4.0 Specific functional and design requirements

4.1 This chapter describes the accommodation and engineering services required for a telephone system. However it must be stressed that the information given is for general planning purposes. The precise requirements and equipment configurations of a particular manufacturer must be ascertained, as these may vary from the information given in this chapter. It is emphasised that the security of this accommodation is an important factor.

Equipment room

4.2 The number of exchange equipment cabinets to be accommodated within the equipment room will be determined by the size of the exchange and may be assessed on the following basis:

Typical maximum numbers	1 cabinet	2 cabinets	3 cabinets
of extensions	400	1000	1600
of trunks	50	120	300

4.3 The following table indicates the weight of equipment:

	1 cabinet	2 cabinets	3 cabinets
Weight of exchange equipment, including cabinets	220 kg	440 kg	660 kg
Weight of termination frames (TJF)	50 kg	50 kg	50 kg
Weight of battery cabinets (assuming 4 hour battery back-up)	440 kg	880 kg	1100 kg
Weight of cable cabinet	140 kg	140 kg	140 kg

4.4 The following table indicates typical room dimensions which will house the equipment scheduled in paragraph 4.3:

1 cabinet	2 cabinets	3 cabinets
4.5 m x 3.5 m	4.5 m x 4.5 m	4.5 m x 5.5 m

Normally, these sizes will provide sufficient space for CILE. If any other equipment not directly concerned with the telephone service is installed in this room (for example data switching apparatus), extra space will be necessary.

Environmental conditions in equipment rooms

4.5 Overheating or high humidity in equipment rooms are the most common factors which cause an SPC exchange to perform erratically, or at worst, "crash" completely.

4.6 Typically, equipment rooms will need to be maintained within a temperature range of 10°C to 30°C with relative humidity ranging from 30% to 65%, but the actual manufacturer's requirements should be confirmed.

4.7 Mechanical ventilation may be sufficient to prevent unacceptable overheating for most of the year but, depending on local circumstances, some cooling is likely to be necessary during the summer months to meet the limits set out in paragraph 4.6.

4.8 Typical heat output from equipment is:

1 cabinet	2 cabinets	3 cabinets
3.5 kW	4.5 kW	5.5 kW

Actual figures should always be confirmed with the equipment supplier.

Electrical services for equipment rooms

4.9 The electrical requirements of SPC exchanges are generally not onerous but do vary considerably from one manufacturer to another. In the majority of hospitals the electrical supply will be taken from the essential circuits and this should be taken into account when deciding on battery back-up capacity.

4.10 In the unusual event of an exchange being served without batteries and rectifying equipment, consideration should be given to the provision of mains conditioning equipment because SPC exchanges are susceptible to voltage fluctuations.

4.11 A 40 amp capacity single phase supply is usually adequate, but different manufacturers require this service

terminated in varying ways, for example a consumer control unit, two 20 amp isolators, a single 40 amp isolator. Some manufacturers may arrange their equipment for a three-phase supply.

4.12 A good earth connection is required. This should comply with the functional earth requirements of BS 6701 and each manufacturer's specific requirement.

"Wet" services

4.13 As a general principle, "wet" services should not be installed in, or routed through, equipment rooms. Exceptionally, where this is unavoidable, there should be no joints in any pipework within the equipment room. If "wet" services in existing accommodation cannot be removed or diverted, special drip trays with suitable drainage connections should be provided.

Operators' room

4.14 The following table provides guidance on the number of operating positions and space requirements:

	1 cabinet	2 cabinets	3 cabinets
Typical number of operating positions	2	5	8
Area of room	10 sq m	25 sq m	35 sq m

4.15 If this room houses extra equipment (for example paging encoders, call logging information equipment, alarm panels) or provides reception or clerical facilities, extra space may be needed.

4.16 A telephone, separate from the operators' consoles, should be provided for use by the staff. This should be in addition to any handsets for receiving emergency calls (see paragraph 2.9).

Staff facilities

4.17 A rest room communicating directly with the operators' room should be provided. There should be seating for at least two persons or up to about half the number of operating positions. Simple facilities for the preparation of snacks and beverages are required, including a sink, small refrigerator, and storage facilities.

4.18 An adjacent WC, including a washhand basin, is required. This WC should be accessible to a person in a wheelchair.

4.19 Staff lockers for the secure storage of personal belongings, and facilities for changing wet clothes, may be required if central facilities are not conveniently located.

Telephone internal cabling distribution (ICD)

Conduit and trunking

4.20 The conduit and trunking for the telephone internal cabling distribution (ICD) is normally installed by the electrical sub-contractor during the construction of the building. Conduit is run to each telephone extension point and terminates in a standard conduit box. Consideration should also be given to the possibility of installing a structured cabling system for the site.

Telephone ICD wiring

4.21 The telephone ICD wiring should be installed in accordance with BS 6701 and a certificate to this effect must be issued by the installation contractor. This wiring should be connected to a standard line jack unit (LJU) mounted on the conduit box at each telephone extension point. Connections at the other end will be in accordance with paragraph 4.25.

4.22 In some new installations, a single wiring system may be preferred to support both voice and data needs. Typically, such a scheme will be based on a different type of socket (normally RJ-45), and the handset will be connected via an adapter. Refer to HGN – 'Structured cabling for IT systems'.

4.23 The telephone ICD wiring need not be part of the contract for the supply and installation of the telephone exchange. In some cases it will be necessary for this wiring to be installed in accordance with the main building contractor's programme of work. It may be provided by either the electrical sub-contractor or another specialist wiring sub-contractor.

4.24 When an existing installation is being upgraded, the customer may wish to purchase the ICD wiring, if this is being rented from British Telecom. In exercising this right, due consideration must be given to the age and condition of the installation. A pre-connection inspection (PCI) will indicate what upgrading is necessary before it can be connected to the new exchange. If the ICD contains circuits which are part of the PTO's network services, the installation of an independent overlay system for these will be necessary. When purchasing an existing ICD, it is important to establish ownership of site duct systems, with clear agreements with regard to their future use.

Telephone wiring termination arrangements

4.25 On existing sites, it is normal for all telephone wiring (both extensions and network services) to be terminated at a main distribution frame (MDF). If, in the upgrading of the installation, ICD wiring is being re-used, the MDF will be connected by interlinking cable(s) to a test jack frame (TJF), which forms part of the new exchange equipment. The siting of the MDF is an important factor. Removal from its existing location may necessitate the complete rewiring of the site.

4.26 Installations on new sites or on existing sites that are to be completely rewired, normally fall into two categories:

EITHER

a. those where the telephone ICD wiring is to be carried out at the same time as the exchange is installed.

   In this instance, the PTO will terminate his services at a network termination point (NTP) and then extend them to the TJF. The exchange contractor, or his installation sub-contractor, will be responsible for finally connecting the telephone ICD wiring to the TJF;

OR

b. those where the telephone ICD wiring is to be carried out in advance of the exchange installation.

   In this instance, the telephone ICD wiring would be terminated at a building distribution frame (BDF), and the PTO would initially terminate his services at a NTP. The exchange contractor should be made responsible for linking the BDF to the TJF and for accepting and commissioning the telephone ICD wiring as an integral part of the complete telephone system. The PTO would be responsible for eventually extending his services from the NTP to the TJF.

5.0 Other general functional and design requirements

5.1 This chapter contains additional guidance concerning aspects of function and design which are common to health buildings generally. They will need to be borne in mind when providing a new telephone service and when upgrading or replacing existing systems and accommodation.

Statutory and other requirements, including Crown immunities

5.2 The guidance takes account, as far as possible, of all statutory and other requirements in force at the time of publication. However, health authorities and trusts are reminded of their responsibility for ensuring compliance with all relevant statutes, regulations, codes and standards.

5.3 Building and planning law are legally enforceable on the NHS. Guidance on the removal of Crown immunity is given in Circular HN(90)27/LASSL(90)15 (in Wales, WHC(91)4 and in Scotland NHS Circular No 1991 (GEN)1), in respect of a wide range of legislation.

Disabled people

5.4 It is essential to ensure that suitable access and facilities are provided for people who have problems of mobility or orientation or other special needs. This category includes, besides people who are wheelchair-bound, those who for any reason have difficulty in walking, and those with a sensory handicap such as visual or hearing impairment. Project teams are reminded of the need to comply with the provisions of:

a. the Chronically Sick and Disabled Persons Act 1970;

b. the Chronically Sick and Disabled Persons (Amendment) Act 1976;

c. the Disabled Persons Act 1981;

d. the Disabled Persons (Services, Consultation and Representation) Act 1986;

e. Department of the Environment Approved Document M (1992) to the Building Regulations 1991 (in Scotland, Part T of the Technical Standards of compliance with the Building Standards (Scotland) Regulations 1990);

f. the Disability Discrimination Act 1995.

5.5 Attention is drawn to BS5810: 1979 'Code of Practice for Access for the Disabled to Buildings' (under review). One of the effects of the 1981 Act is to apply this British Standard to premises covered by the 1970 Act, which includes those open to the public. Practical guidance for complying with the Building Regulations is issued by the Department of the Environment under Approved Document M: 'Access and facilities for disabled people' (in Scotland, a document of the same title is issued by the Scottish Office under Part T of the Technical Standards for compliance with the Building Standards (Scotland) Regulations).

5.6 Project teams should refer to HBN 40 (SHPN 40 in Scotland) – 'Common activity spaces' – a set of four volumes which includes guidance and ergonomic data sheets on access, space and equipment relating to disabled users of health buildings.

5.7 It is recommended that project teams consult local representatives of disabled people, or the Centre for Accessible Environments, with regard to the planning of spaces used by patients and escorts.

5.8 In locations where public telephones are provided, one should be mounted at a height suitable for use by a person in a wheelchair and the handset fitted with an inductive coupler to assist any person using a hearing aid.

Security

5.9 Assaults on hospital staff and theft of NHS property are recognised problems. The project team should discuss security with the officer in charge of the local Police Crime Prevention Department and the hospital or district security officer or adviser at an early stage in the design of the building. Fire and Security Officers should be consulted concurrently because the demands of security and fire safety may sometimes conflict. The attention of planners is drawn to HSG (92) 22, and the NHS Security Manual (in Wales refer to Circular WHN(85)1 and in Scotland refer to Circular NHS No 1984 (GEN)7).

Building components

5.10 The Building Components Database consists of a series of Health Technical Memoranda (HTMs) 54–79 which provide specification and design guidance on building components for health buildings which are not adequately covered by current British Standards. No firms

or products are listed. The numbers and titles of the various HTMs in the series are listed in the 'References' section at the end of this Note.

Smoking

5.11 NHSME circular HSG(92)41, entitled 'Towards smoke-free NHS premises', promulgates Government policy set out in the 'Health of the Nation' White Paper, and required NHS authorities and provider units to implement policies so that the NHS became virtually smoke-free by 31 May 1993. The circular advises that a limited number of separate smoking rooms should be provided, where necessary, for staff and for patients who cannot stop smoking (in Scotland refer to NHS Management Executive letter MEL(1992)24 of 30 July 1992).

5.12 No provision has been made in this Note for staff or patients who wish to smoke.

Upgrading or adaptations of existing buildings

5.13 The standards set out in this guidance essentially apply to the provision of accommodation by new building. However, the principles are equally valid and should be applied, so far as is reasonably practicable, when existing accommodation is being upgraded or new accommodation is being constructed within an existing building which may previously have been used for other purposes. Compromises may have to be made between Health Building Note (HBN) standards and what is possible.

5.14 Before a decision is made to carry out an upgrading project, consideration must be given to the long-term strategy for the service, the space required for the new service, and the size of the existing building. Regard must also be paid to the orientation and aspect of the building, whether or not key HBN requirements can be met: for example, the need for accommodation with ground-level access, and the adequacy and location of all necessary support services.

5.15 If a prima facie case for upgrading emerges, the functional and physical condition of the existing building should be thoroughly examined. The check of physical and other aspects of existing buildings should include:

- availability of space for alterations and additions;
- type of construction;
- insulation;
- age of the buildings and condition of building fabric – for example, external and internal walls, floors, roofs, doors and windows – which may be determined by a condition survey;
- life expectancy and adequacy of engineering services, ease of access and facility for installation of new wiring, pipework and ducts, if required;
- the height of ceilings. High ceilings do not necessarily call for the installation of false ceilings, which are costly and often impair natural ventilation;
- changes of floor levels, to obviate any hazards to disabled people;
- fire precautions;
- physical constraints to adaptation, such as load-bearing walls and columns.

5.16 When comparing the cost of upgrading or adapting an existing building to that of constructing a new building, due allowance – in addition to the building cost – must be made for the costs of relocating people, demolition, salvage, disruption of services in a phased project, and the temporary effects on running costs of any impaired functioning of areas of the building affected by the upgrading works.

5.17 The cost of upgrading work should conform to the guidelines which were originally promulgated in the Department's WKO letter (81)4 (in Scotland refer to SHHD/DS(82)19), and more recently referred to in Volume 4 of NHS Estates' 'Quarterly Briefing'. Those guidelines take into consideration the estimated life of the existing building and the difference in cost between upgrading a building and constructing a new building.

6.0 Engineering services

6.1 This chapter describes the engineering services contained within the accommodation for a telephone service and their integration with the systems serving a whole site. Its purpose is not to inhibit the design solution but to acquaint the engineering members of the multi-disciplinary design team with the criteria adopted (in terms of material specification, design conditions and reference data) to meet the functional requirements.

6.2 The accommodation required for a telephone service is comparatively small and will be unlikely to exist as a self-contained department. It will usually be incorporated with other non-clinical, administrative accommodation on a hospital site. Therefore the engineering services for a telephone service will generally be provided by systems serving adjoining accommodation. It is not considered appropriate to repeat in this chapter all the basic engineering criteria recommended for administrative accommodation and, therefore, the following paragraphs are confined to only those aspects which have to be considered specifically for telephone service accommodation.

Model specifications

6.3 The National Health Service Model Engineering Specifications, including the Scotland and Northern Ireland supplements, are sufficiently flexible to reflect local needs. The cost allowance is based on the quality of material and workmanship described in the relevant parts of the specifications. The cost allowance for the telephone exchange equipment is based on the requirements and guidance contained in NHS Model Specification C47.

Noise

6.4 Excessive noise and vibration from engineering services, whether generated internally or externally and transmitted to individual areas, or noise from other sources, for example speech which can be transmitted by the ventilation system, can adversely affect the operational efficiency of the department and cause discomfort to patients and staff. The limits and means of control advocated in HTM 2045 – 'Acoustics' should provide an acceptable acoustic environment.

6.5 In addition to designing for control of noise levels, there may also be a need to ensure speech privacy, so that confidential conversations are unintelligible in adjoining rooms or spaces. This will be important in the telephone operator's room.

Space for plant and services

6.6 Space for plant and services should provide:

- easy and safe means of access, protected as far as possible from unauthorised entry;
- for frequent inspection and maintenance. Sufficient access panels should be provided for this purpose;
- for eventual removal and replacement of plant.

6.7 Recommended spatial requirements for mechanical, electrical and public health engineering services are contained in HTM 2023 – 'Accommodation for plant and services'. The information in this HTM is specifically intended for use during the initial planning stages when precise dimensional details of plant are not available.

6.8 The distribution of mechanical and electrical services to final points of use should, wherever possible, be concealed in walls and above ceilings. Heat emitters should be contained within a 200 mm wide perimeter zone under window sills, and critical dimensions should be taken from the boundary of this zone.

6.9 The 200 mm zone includes the floor area occupied by minor vertical engineering ducts and is included in the building circulation allowance.

6.10 Services contained in the space above the false ceiling, with the exception of drainage, should be confined to those required for the department.

Safety

6.11 The Health and Safety at Work etc Act 1974, as partly amended by the Consumer Protection Act 1987, together with the Workplace Regulations and the Work Equipment Regulations, imposes statutory duties on employers and designers to minimise – so far as reasonably practicable – any risks arising from the use, cleaning or maintenance of engineering systems. One of the requirements of this legislation is to ensure, so far as is reasonably practicable, that design and construction is such that articles and equipment will be safe and without risks to health at all times when they are being set, used, cleaned or maintained by a person at work.

Fire safety

6.12 The project team should familiarise themselves with Firecode, a series of documents which contains the Department's policy and technical guidance on fire safety in hospitals and other NHS premises. In addition, the Fire Practice Note series provides guidance on specialist aspects of fire precautions (in Scotland refer to 'Firecode in Scotland').

6.13 The design of the engineering services should accord with the recommendations in the above series of documents.

MECHANICAL SERVICES

6.14 The mechanical services include the provision of heating, ventilation, cooling and hot and cold water. For cost allowance purposes, the distribution of the heating and the hot and cold water systems is deemed to exist within adjoining accommodation and can be readily extended to serve the telephone services accommodation.

6.15 Reference should be made to the activity data sheets for environmental requirements in individual spaces. Recommended room temperatures, air change rates, hot water service temperature etc are grouped under "Technical Design Data" on each room data sheet. The assembly data sheets give the disposition of engineering outlets for the activities described.

Heating

6.16 Space heating requirements in the telephone operators' suite can be met by low pressure hot water radiators operating as part of the sub-system serving the adjoining accommodation. Consideration must be given to the 24-hour operational nature of this suite, particularly with regard to the sizing of radiators connected to sub-circuits which have temperature and night set-back compensation.

6.17 Radiators should normally be located under windows or against exposed walls. Sufficient clear space between the top of the radiator and the window sill should be provided to prevent curtains reducing the output and to provide adequate space below for cleaning machinery to be used. Where a radiator is located on an external wall, back insulation should be provided to reduce the rate of heat transmission through the building fabric.

6.18 The heat dissipation from the exchange equipment (see paragraph 4.8) will usually be more than sufficient to satisfy the space heating requirements of the exchange equipment room. Therefore only temporary heating need be provided, to ensure the minimum acceptable space heating temperature (see paragraph 4.6) during the initial installation and commissioning of this equipment.

Temperature controls

6.19 To facilitate temperature control, thermostatic radiator valves should be installed. These valves should be of robust construction and selected to match the temperature and pressure characteristics of the heating system. The thermostatic head, incorporating a tamper-proof facility for presetting maximum and minimum room temperature, should be controlled via a sensor located integrally or remotely as appropriate.

Ventilation – general requirements

6.20 Recommendations for the ventilation of individual spaces are shown on activity data room data sheets.

6.21 Mechanical ventilation systems are expensive in terms of capital and running costs, and planning solutions should be sought which take maximum advantage of natural ventilation.

6.22 Extract requirements can be provided either from a system serving adjacent accommodation or by a local unit.

Ventilation and cooling of exchange equipment room

6.23 The exchange equipment room will need to be mechanically ventilated because of the amount of heat dissipated by equipment. For most of the year, mechanical ventilation will normally be sufficient to prevent overheating and to maintain space temperatures within the operating limits of the equipment. Some cooling may be necessary in summer; this will depend on location and other factors. Paragraph 4.6 deals with environmental conditions and paragraph 4.8 gives some indication of heat output from equipment.

6.24 The requirements can be satisfied by a local self-contained "packaged" ventilation and air cooling unit. It should include enthalpy control features to make use of 100% fresh air for cooling when it is appropriate to do so. Alternatively, the requirements may be met from a system which is in operation continuously and is supplying air at a suitable condition to other adjacent spaces.

Hot and cold water services

6.25 The domestic hot and cold water supply should be taken from the systems serving the adjacent accommodation.

ELECTRICAL SERVICES

6.26 The electrical installation will include wiring and equipment for lighting and power, together with the earth bonding of extraneous metalwork. Extensions from the hospital central systems for clocks, fire alarms and staff location services will also be required. These installations should comply in all respects with the current Regulations for Electrical Installations and conform to the requirements of HTM 2007.

6.27 Reference should be made to the activity data sheets for the recommended levels of internal illumination, disposition of outlets for power, telephones, call systems, and clocks etc in individual spaces. Power supplies for exchange equipment should be taken via sub-mains cable(s) from the nearest switchroom. Final sub-circuits for lighting and small power should be taken from the essential distribution board serving adjacent accommodation, or alternatively from a consumer unit within the equipment room.

6.28 The electrical installation in occupied areas should be concealed, usually using PVC insulated cable in screwed steel conduit or trunking, but in certain circumstances mineral insulated copper sheathed cables may be necessary.

6.29 Steel conduit and trunking wiring ways for the telephone ICD wiring should also be concealed whenever possible.

Electrical interference

6.30 Guidance concerning the avoidance and abatement of electrical interference is given in HTM 2014, and fluorescent luminaires (lighting fittings) should comply with BS 5394.

6.31 Care should be taken to avoid mains-borne radio frequency interference affecting electro-medical equipment used elsewhere in the hospital. See paragraph 3.34 regarding the effects of radio frequency interference on telephone handsets.

Lighting

6.32 Practical methods of lighting the various functional spaces are contained in the CIBSE Lighting Guide. The choice of luminaire should take account not only of the requirement for light distribution and visual comfort appropriate to the space, but also the operational efficiency of the light source used. Luminaires should be of a type which is easily cleaned and maintained, as well as being manufactured and tested in accordance with the requirements specified in the relevant sections of BS 4533. Their location should be readily accessible for lamp changing and maintenance, but with the overriding requirement that the recommended standard of illuminance is provided to task areas. Luminaires using fluorescent lamps should be installed when artificial lighting is required for long periods or where areas are devoid of natural light; intermittently-used luminaires may be fitted with compact fluorescent lamps.

6.33 Control of lighting is normally by local switches, and these should be provided in sufficient numbers to allow variation in lighting options, for example reduced levels of illuminance when circumstances permit, and also to encourage energy conservation.

6.34 In the telephone operators' room where computer-type terminals will be used, the lighting should be designed to avoid bright reflections on the screen and to aid legibility of the contents. Further guidance can be found in CIBSE Lighting Guide LG3.

6.35 In the equipment room, the lighting fittings should be arranged in relation to the equipment cabinet layout to ensure that adequate illumination is available for maintenance purposes when the cabinet doors are open.

Socket-outlets and power connections

6.36 Sufficient 13 amp switched, shuttered socket-outlets, connected to ring or spur circuits, should be provided for the use of all portable appliances. Activity data sheets indicate specific locations for the outlets associated with individual activities; the installation of twin outlets should be considered where these activities occur in juxtaposition.

6.37 Domestic cleaning appliances with flexible leads 9 m long should be assumed, and switched socket-outlets should be provided to enable such machines to operate over the whole area of this accommodation.

6.38 Fixed appliances rated up to 13 amp should be permanently connected to double-pole switched spur boxes and fused as required. Appliances rated in excess of this load, or those requiring a three-phase supply, should be permanently connected to separate final circuits from fuse-boards and be independently switched.

6.39 Local switches or other means of isolation should be provided adjacent to plant and equipment to ensure the safety of operators and maintenance staff.

6.40 Heating appliances and automatically operated equipment should be provided with indicator lights to show when the equipment is energised. Such indicators should be incorporated either in the control panel of the apparatus, in the control switch, or in the socket-outlet from which the apparatus derives its supply.

Emergency electrical supplies

6.41 Guidance concerning the provision of emergency electricity supplies is given in HTM 2011 – 'Emergency electrical services' and the grade of standby lighting provision is shown on the activity data room data sheets. Safety lighting in accordance with HTM 2011 and BS5266 should be provided on primary escape routes.

6.42 All socket-outlets and power supplies in this accommodation should be connected to essential supply circuits.

Electric clocks

6.43 Clocks should be of impulse, synchronous or battery/quartz type.

INTERNAL DRAINAGE

6.44 The drainage required from the telephone operators' rest room and WC should be incorporated as part of the sub-system serving the adjoining accommodation.

6.45 Drainage is a "wet" service and, as such, should be excluded from the exchange equipment room if at all possible – see paragraph 4.13.

7.0 Cost information

Introduction

7.1 For all types of health building, it is important that building costs and revenue expenditure are kept as low as possible and consistent with acceptable standards. Within this general context, Health Building Notes provide a synopsis of accommodation for health buildings which the Department of Health and the Management Executive of the NHS in Scotland recommend for the provision of a given service.

Departmental Cost Allowance Guides

7.2 Departmental Cost Allowance Guides (DCAGs) related to this Note are officially notified in 'Quarterly Briefing' published by NHS Estates. A full listing of all DCAGs is listed in the DCAG Database – a hard copy of which together with some guidance notes can be obtained from NHS Estates.

In Scotland, advice on Departmental Cost Guides (DCGs) is available from the Healthcare Engineering and Environment Unit as the executive body of the Estates Environment Forum.

7.3 The attention of the project team is drawn to guidance given in the Capital Investment Manual (Business Case Guide) published by HMSO. This publication seeks to reflect the important changes that have taken place over recent years, both with the introduction of the NHS reforms and with the changing patterns of healthcare delivery. This new process is intended to reduce unnecessary and often expensive planning work which may subsequently prove to be abortive, and emphasises the necessity for a sound business case in support of the capital expenditure involved. The Capital Investment Manual also states that the Capital Works estimate of the intended scheme must be based, wherever applicable, on industry norms such as the DCAGs/DCGs plus a percentage to cover for on-costs.

7.4 The cost allowances for this Note are made up as follows:

a. the cost allowances reflecting the total building and engineering requirements related to accommodating a new telephone service within an acute or district general hospital;

b. the cost allowance for the telephone equipment (given in increments of 100, from 200 extensions to 1600 extensions). This includes preliminaries and contingencies associated with the purchase and installation of the exchange equipment and handsets.

The cost allowances have been produced in this way so that more realistic costs are included in the building and engineering element for Builder's Work in Connection, Profit and Attendance, and Preliminaries and Contingencies. These items would have been disproportionately high if they had been related to the high cost of telephone equipment as well. It is expected that telephone equipment will be purchased by a separate direct contract with the supplier. This will not attract costs for Main Building Contractor's overheads.

7.5 It is also important to bear in mind that an allowance for on-costs should be added to the cost allowance for this unit, this element being for external works, external engineering services and abnormals etc. The abnormals will largely be determined by the characteristics of the site, such as an inner-city location, or the condition and type of the existing building if refurbishment is the only option.

7.6 It is also important that project teams assess at the earliest opportunity all the likely on-cost implications of individual sites and schemes.

7.7 Cost allowances are exclusive of VAT, professional fees, building and planning fees and all local authority charges and are based on a Locational Factor of 1.

Locational factors

7.8 Locational factor adjustments may be applied to the works costs (that is, the total of the cost allowance plus the requisite on-costs) to take into account the local market conditions. For further information regarding these please refer to the Regional Location factors in 'Quarterly Briefing' published by NHS Estates or, for Scotland, the Healthcare Engineering and Environment Unit which is the executive body of the Estates Environment Forum.

Functional units

7.9 The functional unit for this Note is the telephone extension. The number required will determine the number of exchange equipment cabinets needed, and this in turn will establish the appropriate scale of accommodation which has to be provided (see paragraph 4.2). The activity spaces and areas used for costing the

functional units are listed in the schedules of accommodation at the end of this chapter.

Optional accommodation and services (OAS)

7.10 This Note, where appropriate, draws attention to project options for providing services or facilities, including the likely cost implications. This information will enable the project manager to select the solution which is most suitable to their needs. The optional accommodation and services (OAS) spaces costed in this Note are listed in the schedules of accommodation at the end of this chapter.

Dimensions and areas

7.11 In determining spatial requirements, the essential factor is not the total area provided but the critical dimensions, that is, those dimensions critical to the efficient functioning of the activities which are to be carried out. To assist project teams in preparing detailed design solutions for the rooms and spaces, studies have been carried out to establish dimensional requirements in the form of critical dimensions. The results of these studies appear as ergonomic diagrams in Health Building Note 40 Volumes 1–4 and Scottish Health Planning Note 40.

7.12 For development planning and at the earliest stage of a design, it may be convenient for designers to have data available which will enable them to make an approximate assessment of the sizes involved. For this reason, the areas prepared for the purpose of establishing the cost allowances are listed in the schedules of accommodation at the end of this chapter.

7.13 It is emphasised that the areas published do not represent recommended sizes, nor are they to be regarded in any way as specific individual entitlements.

7.14 Planning of the building efficiently may also necessitate variation of areas; for instance, in the refurbishment or conversion of older property:

a. rooms tend to be larger than the recommended area;

b. some rooms may be too small or in the wrong location for efficient use;

c. circulation space tends to form a larger than normal proportion of the total area.

Circulation

7.15 A circulation space allowance of 2% has been included for corridor space. This is only a nominal amount which is added to the other standard allowances for planning and the engineering zone so as to give an overall allowance of 10%. The standard allowance for planning is 5% and 3% for the engineering zone adjacent to the external walls and all small vertical ducts. Spaces occupied by partitions and walls are deemed to be included in the circulation space allowance. These areas are all included and therefore costed in the DCAGs and DCGs.

7.16 It is also important to remember that the circulation figures included in the cost allowance for this Note are those anticipated for new purpose-built premises with no constraints. Where constraints are encountered, for example in refurbishment or conversion of older types of property, this circulation figure would be likely to increase accordingly, therefore some adjustment may be necessary to the circulation figure.

Communications

7.17 Staircases, lifts and plantrooms are not included in the cost allowance relevant to this unit. Costs related to these elements, along with a suitable space standard allowance, should be made in the on-costs. For further details please refer to HBN 40 Volume 4 – 'Circulation areas'.

Land costs

7.18 As is the norm for DCAGs and DCGs, costs are exclusive of all land costs and associated fees. However the project team's attention is drawn to the fact that costs associated with these should be included in the business case submission, all as detailed in the Capital Investment Manual, and could therefore be an important part of the overall cost viability of the scheme.

Engineering services

7.19 The following engineering services, as described in the engineering chapter and exemplified in the Activity Data, are included in the cost allowances. Primary engineering services are assumed to be conveniently available at the boundary of the unit.

a. **Mechanical services**

Heating: generally low pressure hot water system with thermostatic control, except for the telephone equipment room;

Ventilation: mechanical supply, with cooling as required, and extract to telephone equipment room. Mechanical extract to WC. Mainly natural elsewhere;

Cold water service: supplied from a central storage system to service points and includes drinking water and hose reels;

Hot water service: supplied from a central storage system. Storage is not included;

b. **Electrical services**

Lighting system: general lighting as required by tasks. Fluorescent, tungsten, safety and emergency luminaires as appropriate;

Power system: power supplies to telephone equipment room. Socket-outlets and other power outlets for fixed and portable equipment;

Standby and safety installation from the main hospital site;

Supplementary equipotential earth bonding;

Functional earth for telephone equipment;

Alarm system: fire, security. Wireways for alarm systems may be located in telephone operators' room;

Clocks: may be of impulse, synchronous or battery/quartz type;

Data transmission: conduits only.

Telephone equipment

7.20 The following items are included in the cost allowances for the supply and installation of telephone equipment:

a. equipment cabinets, complete with power and extension circuit boards to capacity selected;

b. exchange lines circuit boards arranged for 20% (or minimum of 16 lines) fall back;

c. network termination point and test jack frame to suit capacity selected;

d. battery and power supply/charger for four-hour standby;

e. operator consoles and interconnecting cables to equipment cabinets;

f. telephone instruments for initial capacity including handsets, payphones and other specialist telephone instruments, plus 5% (see paragraph 3.36);

g. interface equipment for coupling of staff paging system;

h. testing and acceptance of equipment by PTO.

7.21 The telephone internal cabling distribution within departments, including the terminating line jack units, is not included in the cost allowances promulgated with this HBN. This aspect is now included in the respective DCAGs and DCGs, as described in the relevant HBNs.

7.22 The telephone cabling distribution to buildings and between departments within buildings should be taken as an external works on-cost for the purposes of the Capital Investment Manual procedures. There are several other items necessary to complete a telephone system which, because of their extremely variable nature, are not included in the cost allowances for telephone equipment and should also be taken as an external on-cost for the purposes of the Capital Investment Manual procedures. These include:

a. connection charges levied by the PTO for exchange lines;

b. provision of private circuits, including any equipment for multi-channel working;

c. purchase of an existing telephone ICD from the PTO together with any upgrading necessary to satisfy the pre-connection inspection;

d. provision of any associated "overlay" for the PTO's network services.

7.23 No cost allowance can be recommended for the optional additions of CILE and Directory Package. These features are also extremely variable in cost due to their dependence upon a particular manufacturer's detailed equipment and software.

Schedules of accommodation

7.24 The following schedules are based on the text in Chapters 3 and 4, and are illustrative of the acceptable accommodation for the functional units detailed.

Para. No	Activity Space	Space Area m²	1 equipment cabinet Qty	1 equipment cabinet TOTAL AREA m²	2 equipment cabinets Qty	2 equipment cabinets TOTAL AREA m²	3 equipment cabinets Qty	3 equipment cabinets TOTAL AREA m²
	Exchange equipment room		1	16.0	1	20.5	1	25.0
	Telephone operators' room		1	10.0	1	25.0	1	35.0
	Staff rest room/beverage bay		1	6.0	1	10.0	1	10.0
	WC - type 5		1	4.5	1	4.5	1	4.5
	Net Total	4.5		36.5		60.0		74.5
	Planning		5%	1.8	5%	3.0	5%	3.7
	Sub-Total			38.3		63.0		78.2
	Engineering Total		3%	1.1	3%	1.9	3%	2.3
	Circulation etc		2%	0.8	2%	1.3	2%	1.6
	Total			40.2		66.2		82.1
	Department Total			**40.0**		**65.0**		**80.0**

Optional Accomodation Services

Para. No	Activity Space	Space Area m²	Planning	Sub-Total	Engineerg.	Circulaton	Total
	Staff change/lockers - 5 people	5.5	0.3	5.8	0.2	0.1	6.0
	Staff change/lockers - 10 people	7.0	0.4	7.4	0.2	0.1	7.5

8.0 Activity data

8.1 Activity DataBase is a computerised information system developed to help project and design teams by defining the users' needs more precisely. This information constitutes the computerised Activity DataBase for Windows, updated twice yearly.

8.2 Room Data Sheets record in more detail than is described in this Note, each task or activity that is performed in a particular activity space, together with environmental conditions and the technical data necessary to enable the activities to be performed. Each Room Data Sheet also contains a list of relevant assembly and component codes and descriptions. Room area information is provided in conjunction with a room graphic.

8.3 Assembly Data Sheets provide narrative text and ergonomically arranged graphics to scale relating to one activity. They show equipment fitted or supplied as part of the building, and the necessary engineering terminals.

8.4 Component schedules provide information about the total quantities of group 1, 2 and 3 components for single data sheets or for all data sheets for a department. Group 4 components are not included in the schedule – see paragraph 1.13.

8.5 Activity data is only available in the form of magnetic media, but users may generate paper copies where required.

8.6 Further information about the use and preparation of activity data can be obtained from NHS Estates, Department of Health, 1 Trevelyan Square, Boar Lane, Leeds LS1 6AE.

Activity data applicable to this Note

8.7 The Room Data Sheets recommended for the activity spaces described in this Note are either new sheets, amended ones or ones selected from existing sheets.

8.8 Further activity data sheets may be selected, or drawn up by project teams to their own requirements, for any services not described in the Note.

8.9 In order to ensure consistent and economic provision, variations from the Room Data Sheets recommended for the spaces covered in this Note should be considered only where it has been decided that the function of a space will differ substantially from that described.

8.10 The Room Data Sheets listed in Activity DataBase may not carry a title identical to the activity spaces detailed in this Note. Use of the appropriate code number will, however, result in the correct activity space being accessed.

Appendix: Training of staff in use of stored program control (SPC) telephone exchange facilities

Introduction

1. One of the features of stored program control (SPC) exchanges is the wide range of facilities which are available. Many of the facilities were formerly the prerogative of the operator rather than the extension user. The current generation of exchanges now transfers these facilities to the extension user.

2. This trend is likely to continue and should be encouraged, but in order to make it effective, the extension user must be fully aware of the facilities which are available and be trained in their use. A further benefit is that the extension user is less dependent on the operator and this can possibly reduce the operator's workload.

3. The organisation of training in hospitals can be complex due to the high number of staff requiring training. This is coupled with the difficulty of staff being made available for training. Generally, this presents a much greater problem than is usually encountered in a commercial organisation.

4. Within the terms of the equipment contract, the contractor is usually made responsible for the training of staff involved, and the NHS Model Engineering Specifications incorporate this obligation.

Users

5. Normally, the contractor is allocated a room to be used for training and, within the terms of the contract, will provide a number of extensions to allow:

a. the facilities to be demonstrated;

b. the staff to obtain "hands-on" experience.

One of these extensions is usually of the loudspeaking type in order to allow the tones to be demonstrated.

6. A detailed training programme is normally prepared in conjunction with the hospital administration allowing varying groups of staff to attend the demonstrations, the size of which may depend on the number to be trained and the accommodation available.

7. In larger hospitals, groups of up to 100 have to be trained and although not all are able to have "hands-on" experience, they are made aware of the facilities. An extension user card is, of course, always available to remind users of the method of operation. This information can also be repeated in the internal directory or can be printed from the screen onto handsets.

8. The training of extension users may be undertaken by using demonstration techniques as outlined above, which may include the use of video training films. Each extension user should receive a demonstration of all the facilities, even if these may not be available at every extension.

Supervisory staff

9. This group would typically include an administrator and the telephone supervisor and may require attendance at a special training course run by the contractor. This training should enable them to manage the exchange, to make supervisory changes to facilities and to continue to provide training for operators and extension users.

10. Normally, the cost of the course is included in the equipment contract, but travel and subsistence may be an additional charge.

Operators

11. It is essential that all operating staff, including night shift staff, should be fully trained before the exchange is brought into service. It is recommended that training instructors remain on site for a period after bringing the exchange into service.

12. Normally, the exchange will be working, but not in service, at least one week before the "bring-into-service" (BIS) date, and the operators may be trained in this period. Alternatively, training may be undertaken at another location which has a similar exchange.

Timing

13. The training programme can be commenced before the BIS date, but experience has shown that while it may be more effective to train supervisors and operators before this date, extension users can generally be trained after commissioning. However, special consideration may be appropriate for the early training of some key personnel, for example cardiac arrest team, night charge staff, and security staff.

14. The disadvantage in "pre-training" users is best shown in a large hospital where, due to the numbers involved, staff may well receive training some three weeks before the BIS date. The real advantage in training after the BIS date is that all of the staff involved can immediately begin to use the facilities of the newly-commissioned exchange.

15. There is no disadvantage if staff are using their extensions without being aware of the full facilities, as they can continue to operate the new equipment similarly to the previous exchange, although it is helpful if a short memorandum is circulated explaining the very basic features of making internal and external calls.

16. Appropriate arrangements will need to be devised to ensure that staff who start their employment subsequent to the BIS date and main training programme receive adequate instruction in the correct use of the telephone system.

17. It is recommended that system user training be included in staff induction courses and that periodic refresher courses are provided.

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2 The whole hospital briefing and operational policies, 1993.
3 –
4 Adult acute wards, 1990
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6 Radiology department, 1992
6 Supp 1 Magnetic resonance imaging, 1994
7 –
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Enquiries should be addressed to: The Publications Unit, NHS Estates, Department of Health, 1 Trevelyan Square, Boar Lane, Leeds LS1 6AE.

The price of this publication has been set to make some contribution to the costs incurred by NHS Estates in its preparation.

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Design Guides – complementary to Health Building Notes, Design Guides provide advice for planners and designers about subjects not appropriate to the Health Building Notes series. *SO*

Estatecode – user manual for managing a health estate. Includes a recommended methodology for property appraisal and provides a basis for integration of the estate into corporate business planning. *SO*

Concode – outlines proven methods of selecting contracts and commissioning consultants. Reflects official policy on contract procedures. *SO*

Works Information Management System – a computerised information system for estate management tasks, enabling tangible assets to be put into the context of servicing requirements. *NHS Estates*

Health Building Notes – advice for project teams procuring new buildings and adapting or extending existing buildings. *SO*

Health Guidance Notes – an occasional series of publications which respond to changes in Department of Health policy or reflect changing NHS operational management. Each deals with a specific topic and is complementary to a related HTM. *SO*

Health Technical Memoranda – guidance on the design, installation and running of specialised building service systems, and on specialised building components. *SO*

Health Facilities Notes – debate current and topical issues of concern across all areas of healthcare provision. *SO*

Encode – shows how to plan and implement a policy of energy efficiency in a building. *SO*

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